Bölüm 8

DENTAL RADYOLOJİDE ULTRASONOGRAFİ KULLANIM ALANLARI

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GİRİŞ

Ultrasonografi (USG) ses dalgalarının kullanıldığı bir tanısal görüntüleme yöntemidir. Spekturumda 20kHz üzeri frekanstaki ses dalgaları Ultrasonik ses dalgaları olarak adlandırılırlar ancak tanısal ultrasonografide kullanılan ses dalgaları 2-20 MHz dalga boyları aralığındadır (1). Ultrasonik görütülemede kullanılan ses dalgaları, elektrik sinyallerinin mekanik titreşime dönüştürüldüğü iki farklı metotlar oluşturulur. İlk yöntem magnetostriktif etki yöntemidir ki bu bazı ferromagnetik materyallerin elektromagnetik bir alanda boyutsal değişim göstermesine denmektedir. İkinci yöntem ise piezoelektrik etki yöntemidir. Piezoelektrik etki, elektrik akımı yardımıyla bazı kristallerin mekanik baskı veya gerilim oluşturması veya tam tersi biçimde mekanik baskı veya gerilime maruz kaldığında elektrik açığa çıkarmasına denmektedir. USG görüntülemenin temelini oluşturan bu fiziksel enerjinin dönüşümü presibidir. Ultrason cihazının enerji dönüşümü olayını gerçekleştiren parçasına transdüser denir ve transdüseri taşıyan bir prob vardır. Ses dalgalarının frekansı arttıkça yansıyan ses dalgasının proba dönme olasılığı ve miktarı artacaktır. Dolayısıyla ses dalgasının frekansı arttıkça daha yüzeyel görüntüleme kapasitesi artar(2). Dental radyolojide kullanılan probların frekans aralığı 2-22MHz dir (1).

Ses dalgaları insan vücuduna uygulandığında, farklı dokulardan geçerek ilerler. Ses dalgaları vücut dokularıyla etkileşime girdiklerinde absorbsiyon, yansıma, saçılma, kırılma ve difüzyon gibi fiziksel değişimlere uğrarlar. Vücut dokularının ses dalgalarına uyguladığı dirence akustik empedans denir. Farklı doku yoğunluğu ve elastikiyeti nedeniyle farklı akustik empedansa sahip dokuların içerisinden geçen ses dalgası her doku için karakteristik bir internal eko oluşturur (2, 3). Yumuşak doku-hava ve yumuşak doku-kemik geçişlerinde ortamın akustik empedansı katsayısı ani ve aşırı bir değişime uğradığı için yansıma ve saçılma çok fazladır.

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